MEMORANDUM

DATE: March 6, 2019
TO: Sarah Mangelsdorf, Provost and Vice Chancellor for Academic Affairs
FROM: Steven M. Swanson, Dean and Professor
RE: Final Summary of Review for:
   - Master’s – Pharmaceutical Sciences
   - PhD – Pharmaceutical Sciences

The Master’s and Doctoral – Pharmaceutical Sciences program review was completed by a review committee chaired by: Dale E. Bjorling, Associate Dean for Research & Graduate Training, UW School of Veterinary Medicine with members: Elaine T. Alarid, Professor of Oncology, Professor, McCardle Laboratory for Cancer Research; James L. Keck, Associate Dean for Basic Sciences, UW SMPH and Gail Robertson, Professor, Department of Neuroscience, SMPH and GFEC Representative. The review committee was charged with assessing the strengths and weaknesses of the program and recommendations for future directions. The School APC discussed and approved the review committee report on March 1, 2019. Based on my review of their report and the APC response, I am providing the following executive summary of the program review:

Overview
Overall, the Committee found that the program is functioning well and delivering high-quality graduate training that supports the mission of the School of Pharmacy and the University of Wisconsin-Madison. Strengths of the program include that the multidisciplinary nature of the program and program retreats that focus on improvements. The administration was considered to be supportive, responsive to students needs and engaged with alumni. Recruitment efforts are seen as robust and effective. Students are active in national societies and have opportunities to engage with industry representatives. Areas for improvement include a succession plan for current program leadership, increased involvement of students in program governance, improved web presence for the program, and consistencies within the program of aspects such as preliminary exam format. Other areas for improvement include diversifying applicants’ countries of origin and increasing the number of students recruited to the program. Finally, student career advising could be strengthened.

Recommendations
The Program leadership is committed to addressing the concerns raised by the Review Committee. Improvements include establishing a Pharmaceutical Sciences Graduate Program Committee that could improve both the robustness and transparency of program governance. New and improved marketing strategies by our new Office of Marketing and Communications at the School of Pharmacy can help develop recruitment materials to increase awareness of the program and broaden the type and origin of candidates. Greater emphasis will be placed on student experience and advising. Specific community building events are currently being rolled
out as improved communication and clarity of policies in the student handbook. Greater attention will be placed on the development of Individual Development Programs, mentor training and transparency/communication.

**Attachments**

Self-Study  
Review Committee Report  
Program Response

**Copies**

Ron Burnette, Chair, Pharmaceutical Sciences Division  
Chuck Lauhon, Assistant Dean of Graduate Studies  
Melgardt M. de Villiers, Associate Dean for Academic Affairs  
Kim Rantanen-Day, School of Pharmacy Dean's Office  
Dale E. Bjorling, Chair, Program Review Committee  
Jocelyn Milner, APIR  
Sarah Kuba, APIR  
Bill Karpus, Graduate School  
Parmesh Ramanathan, Graduate School
MEMORANDUM

TO: Steven Swanson, PhD (Dean), School of Pharmacy, University of Wisconsin Madison.
Charles T Lauhon, PhD, Vice Chair Pharmaceutical Sciences Division, Assistant Dean for Graduate Studies; Ken Niemeyer, Graduate Programs Coordinator (Senior Student Services Coordinator)

FROM: Melgardt de Villiers, PhD (Chair Academic Planning Council), Associate Dean Academic Affairs, School of Pharmacy, University of Wisconsin Madison

RE: 10 Year Program Review Graduate Programs Pharmaceutical Sciences

Date 3/1/2019

The Academic Planning Council of the School of Pharmacy at the University of Wisconsin Madison met on 3/1/2019 and unanimously approved the report and recommendations of the program review for the Graduate Programs in Pharmaceutical Sciences.

Sincerely

[Signature]
A. Response to Previous Program Review Recommendations

The Pharmaceutical Sciences PhD Program was last reviewed in 2009 by a committee consisting of faculty from Pharmacy Schools at peer institutions whose expertise were representative of the breadth of Pharmacy graduate programs as a whole, and were not necessarily focused on a science based PhD program per se. That External Review Committee (ERC) provided five main areas of improvement for our program and these are addressed below. We have also included our own strengths and weaknesses identified from the 2009 self study for additional reference. The entire ERC report is provided as Appendix item A1.

Strengths and Weaknesses Identified by the Program During the Last Self-Study (2009):

**Strengths**
- Research achievement, measured by faculty funding levels and productivity has been excellent, leading to increased program visibility.
- A new building resulted in significantly improved research resources, including analytical and animal facilities.
- Since the consolidation, there has been growing collaboration within the Division.
- There has been a recent improvement in infrastructure that has increased participation of graduate students in Division activities, curriculum assessment and governance.
- Organization and resources for recruiting prospective graduate students has notably increased.

**Challenges**
- Recruiting a diverse set of top-quality graduate students that matches the broad research interests of Division faculty remains a challenge.
- The program has had difficulty recruiting underrepresented minority students.
- The current funding environment and insufficient fellowship support makes recruiting and supporting graduate students unpredictable.
- Transition into the new curriculum requires improved communication among program administration, students and faculty for ensuring proper student guidance.
- Communication to best balance the needs of the overall Division with the diverse requirements of each of its cores is an ongoing challenge.
Report from the 2009 Program Review and Program Response

The Pharmaceutical Sciences Division in the School of Pharmacy was created in 1996 by merging basic science curricular areas, each previously offering their own Ph.D. degree program. The new structure consists of three core areas: drug discovery, drug action, and drug delivery. Theoretically, the amalgamation was to have created a critical mass of faculty with interdisciplinary interests in pharmaceutical sciences. In effect, the consolidation seems to have merely removed the names of the traditional basic science areas from the degree track without resulting in the desired integration. This was viewed as one of the factors that would be detrimental to efforts by the Division to obtain a graduate training grant. The identity as a Pharmaceutical Sciences program is in jeopardy unless the Division can find ways to bring the faculty closer together through strategic recruiting and the development of additional programs designed to enhance the communal culture. The ERC believes that the future success of the Division will depend upon its ability to find ways of becoming more fully merged.

The ultimate success of the Pharmaceutical Sciences Division will depend largely upon the accomplishment of its stated mission of integrating the core areas as a means of increasing collaborative interaction and enhancing graduate student development. Attainment of this goal can result only when the Division has 1) strong leadership from a chair empowered with suitable resources and authority, and 2) faculty members who embrace the idea of providing graduate students with training in the broad field of pharmaceutical sciences while emphasizing their areas of specialization. The ERC believes that the Division can facilitate realization within the next five years of its plan by quickly developing a comprehensive strategy for creating a culture of cooperation and commitment. Central to this effort will be the development of a blueprint for faculty recruitment and retention focusing on insuring that all faculty members embrace their roles as educators and scholars in the pharmaceutical sciences arena. Willingness to teach in the professional and graduate programs as well as to mentor graduate students in the Pharmaceutical Sciences Division should be included as components of the assessment for promotion and tenure and of the annual faculty evaluation process.

Critique #1: The majority of students interviewed by the ERC identified themselves as being associated with a specific faculty mentor rather than with a Pharmaceutical Sciences graduate program.

Response: We have increased cohesion and common experiences among students in the program during the last 10 years. These efforts include:

(1) A highly popular and interactive required course in research ethics (726-800);

(2) An increase in membership and activity of our student AAPS chapter, to which most of our students belong and are active. Activities range from pure social events to sponsoring seminars, attending and hosting conferences and professional development visits from PhD alumni.
Our students are involved in student-run Midwest regional annual research meetings, such as the Pharmaceutics Graduate Student Research Meeting - (PGSRM). Our students hosted in 2011 and will do so again in 2019. Graduate students from Pharmaceutical Sciences Programs from major research universities in the Midwest attend. The Dean also provides support for our students to attend the annual Am. Assoc. Pharmaceutical Scientists (AAPS) national meeting. These experiences reinforce a shared student experience as future scholars in Pharmaceutical Sciences, not just in the more narrow field of their research lab.

We have brought back student-run research/career exploration retreats that involve graduate alumni for professional development and networking (see Program Appendix, item K1)

Critique #2: The students also expressed the opinion that more required course work taught by Division faculty would be desirable. Additionally, students felt that they should present a seminar every year as a means of developing their professional communication skills.

Response: After consulting students in a 'town hall' type meeting, the seminar structure was redesigned, such that each core of the program has its own designated seminar course (718-931; 718-932). These courses feature a mix of student and outside speakers. Students present once per year with written feedback from the students and faculty. In addition, there are several annual program-wide colloquia featuring more eminent outside speakers. (see Appendix item B2 for recent seminar list and course syllabi). As a formal course, student attendance is required, while faculty attendance is expected.

More recent meetings with students about increased course work has resulted in mixed responses. Some students appreciate the flexibility of a small number of course requirements, while others would like to see more didactic content that is of broader use for their career goals. We are currently weighing options to strike the right balance in formal offerings including how best to provide content that is more applicable to their potential careers in industry. The latter includes knowledge about industry protocols (GMP, GLP) and drug development paradigms and techniques, including regulatory and clinical trial fundamentals. The School has an outside 'Board of Visitors' alumni/stakeholder group that provides feedback to program leadership about such training needs.

Critique #3: The Division has condensed and refined its process for recruitment of students to the program. This has helped in the identification and admission of high quality students. Nevertheless, since many students elected to enter the program in order to work with a specific faculty member, changes in recruiting need to be made to ensure that students matriculate because of a desire for a career in pharmaceutical sciences.

Response: We have found over the last ten years that, in fact, many of our students join the program with wide open expectations for their training. The interdisciplinary nature of the program may attract such students. For many of our incoming students we have difficulty temporarily identifying which core of our Division they wish to align themselves (in order to pick one of the required core seminar courses). Moreover, many faculty lament that students
they 'recruited' to our program end up working for a faculty member in an entirely different core or research field after their rotations. We believe this is a healthy sign that our entering students do indeed identify with an overall interest in Pharmaceutical Sciences; it is now more incumbent on our faculty to meet the student expectations for broad training in the field in addition to the specific training of their thesis research. In addition, we have had only 2-3 direct admit students in the last ten years and > 95% of our students in that time have completed the standard three laboratory rotations prior to finding a permanent lab.

**Critique #4:** Several of the students are supported by a Teaching Assistantship (TA) during their entire time in the graduate program. This practice often delays completion of the dissertation research and extends the duration of time to completion of the degree. The ERC recommends that TA support be used more strategically as an aid to student recruitment and as part of a bridge funding mechanism for faculty seeking grant renewal. Shorter student resident times may also result from diminishing reliance on TA support.

**Response:** In recent years, the average number of dissertators who are supported by TAs in a given semester has dropped to around 2-3 students (10-15%). The overwhelming majority of students are not supported by a TA during years 3-5. This decrease has correlated with the increased success of our domestic students in securing outside funding in the form of fellowship and training grant support. As part of our orientation, we stress the benefits of applying for fellowships early and often and have hired academic staff who assist with fellowship submission. Our PhD time to degree of 5.16 years is near the University average.

**Critique #5:** Students meet with their thesis committees once a year. Moreover, students tended to feel intimidated by their major professors. The ERC believes that more frequent meetings of the thesis committee prior to the time that the student passes the preliminary examination and starts full-time on a dissertation research project would benefit development of a multidisciplinary pharmaceutical sciences culture within the Division. Additionally, this may alleviate the student belief that their fate is controlled by a single faculty member.

**Response:** The successful implementation of annual thesis committee meetings took considerable time and effort by program leadership and is the result of the disciplinary breadth of our program, which spans the physical and biological sciences. We feel it is unrealistic to expect more frequent meetings. The introduction of the Individual Development Plan, the movement to broaden the training of PhDs on this campus, and efforts by program leadership to connect students with alumni have all hopefully helped to reduce the feeling of students that they are beholden solely to their PI for career advice and placement. Exit surveys of our PhD graduates show that half of our students reported having a significant faculty mentor who was not their advisor (Appendix item F2, p.8)
B. Overview of the Program
Program History and Administrative Structure

Briefly, the Pharmaceutical Sciences Division emerged in 1996 as an amalgamation of 5 smaller PhD programs in areas ranging from Medicinal Chemistry to Pharmaceutics (see consolidation in Figure 1 below). This is a unique structure for graduate programs in Schools of Pharmacy, in that most have separate departments with budgetary autonomy. Pharmaceutical Sciences is one of three Divisions in the School, none of which have specific resource allocations. Thus, in the eyes of the University, the Dean is also the Chair of the "Department of Pharmacy" as well as the Chair of the School's executive committee. As noted by the 2009 program review committee, some challenges for the Pharmaceutical Sciences program relate to this unique structure, in that the program needs to balance the strengths of greater resources and research opportunities for students in the broad Division, with the tendency of individual faculty and students to focus on their particular areas of interest. This impacts a range of activities from recruiting and research resource allocation, to teaching and learning priorities.

![Diagram of Consolidation of graduate programs](image)

**Figure 1.** Consolidation of graduate programs in 1996 (formally approved 1998) to give the current Pharmaceutical Sciences Division in the School of Pharmacy.

In terms of administration, the School of Pharmacy currently has a separate Associate Dean for Research and an Assistant Dean for Graduate Studies. In addition to the Pharmaceutical Sciences program, the School has MS and PhD programs in Social and Administrative Sciences in Pharmacy as well as a combined MS/two-year residency program in Pharmacy Administration. The latter program is housed at UW Hospital. The Asst Dean formally administers these three quite different graduate programs with the assistance of the Graduate Program Coordinator, who assists in disseminates information from the Graduate School and Asst Dean to the individual programs, as well as providing students information about policies, deadlines, and opportunities to assist their smooth progression through the program. This current administrative organization is depicted in Appendix item B1.

The Pharmaceutical Sciences Division is divided into three administrative 'Cores' - Drug Discovery, Drug Action and Drug Delivery. The Division is led by the Chair, along with two appointed Vice-Chairs, such that each core is represented in administrative decision-making. Functionally, the Cores have provided a structure for assigning teaching and committee service
within the Division. They also facilitate information flow to and from the Chair to faculty in each Core concerning issues that impact the teaching, research and service missions of the Division. Students are loosely affiliated to the core structure via their faculty advisor as well as which seminar course they attend. Otherwise they are not bound to the core structure in terms of recruiting or joining a research group.

Currently, the Graduate Program is administrated by one of the Vice Chairs (who is also currently the Asst Dean for Graduate Studies). Internal policy concerning the graduate program can be initiated by the Dean, Asst Dean, or Division Chair, or suggested by faculty, staff or students. Graduate School policy is communicated initially to the Dean and/or the Asst Dean for Graduate Studies who then disseminates this information to the Chair and Vice Chairs and to faculty and students. The Chair and Vice Chairs make up a three member de facto Graduate Program Committee by considering the wide variety of requests and policy decisions that are encountered during administration of the program. Program policy changes and program assessment discussions of particular potential impact are brought regularly to the Division faculty for discussion and approval. Student input is gathered through annual meetings by the Program Director with each class in early summer and previously through town hall type meetings. Additional lines of communication are provided by the student AAPS chapter, a professional organization which has leadership positions. That group of student leaders are often consulted by the Program Director and the Chairs for input on a variety of policy issues and opportunities affecting students in the program. Administrative support for the Program Director consists solely of the Graduate Program Coordinator (GPC), who provides support for all activities in which the program is involved. This includes all recruiting and marketing activities, admissions, committees, student administrative support, student advising, student alumni relations and career services support. The School has in place positions specifically for program assessment (an Asst Dean and a Director of Assessment) and has recently hired an Assoc. Dean in Marketing and Communications, the latter of which will assist program leadership in these areas.

**Mission of the Pharmaceutical Sciences Division:**
The mission of the Division of Pharmaceutical Sciences is "To discover, to teach, and to apply knowledge in the three fields of Drug Discovery, Drug Action, and Drug Delivery. This mission is accomplished through the education of undergraduate, graduate, and professional students, by conducting innovative research, and by providing service to the professional, scientific, and public communities."

This mission is in line with the School of Pharmacy's mission statement to 'educate, train, and provide life-long learning opportunities for students, pharmacists and scientists, while creating, disseminating and applying new knowledge based on research in the biomedical, pharmaceutical, social and clinical sciences to enhance the quality of life through improved health."

**Program Degree Requirements**
The course requirements for the PhD and the MS degree are equivalent, as students are expected to finish course requirements and become dissertators by the end of their second
We do not recruit students who seek a terminal MS degree; this degree is awarded to students who leave the program before completing the PhD, if they have met the course requirements and defend an MS thesis. Other instances where the MS is awarded include students who are working for program faculty and are enrolled in a different PhD program but would like to complete an MS in Pharmaceutical Sciences along the way to their PhD. The course requirements (see Table below) include one required one semester course in introductory principles (718-780) that spans the research areas of the three cores and is framed around research topics that are involved in the drug approval pipeline. The course is taught in three modules based on the cores and is taught by a variety of faculty each year. The three cores currently approach the material in different ways, which can be a challenge for students, who have given the course mixed reviews throughout its tenure. We are constantly looking for ways to improve the course, although in many ways the discussion surrounding the course reflects all of the different cultures inherent in a broad interdisciplinary group of faculty.

In addition to this main 780 introductory course, each core is responsible for identifying a course of its own that includes the basic principles of its research area. The Discovery Core offers a course that encompasses organic synthesis, medicinal chemistry and research areas at the interface of chemistry and biology (718-786). The Drug Action Core requires students take the cell signaling course (630), which is crosslisted in Biochemistry and offered by Pharmacology faculty in the Medical School. The Drug Delivery Core requires students to take Pharmacokinetics (718-768), which is a highly valuable course for those students planning a career in the pharmaceutical industry. Because of the breadth of these three areas, students are required to take two of the three courses to satisfy the degree requirements.

Additional requirements include the Responsible Conduct of Research (i.e., ethics) course (726-800), which is a popular course due to its compelling content and highly interactive teaching methodology. The course is taught by an interdisciplinary team of faculty in the School and is helpful for creating a positive work climate, because it brings the students together to talk about different viewpoints on issues that we all face as part of our daily professional activities. The course was recently expanded from one to two credits due to the popularity of the weekly discussions. The course also includes students from the Clinical and Translational Sciences MS and PhD programs and may be expanded to include more graduates programs which would increase the range of perspectives further.

The final course requirement is the seminar course, which as mentioned above was introduced as a result of poor faculty involvement in our previously structured Division-wide seminar series and specific student input on how to fix the seminars. In these courses, each core has its own weekly seminar featuring either two students or an outside speaker presenting. When the students present, they are giving written and/or oral feedback by faculty and students. This prepares our students to give professional level research talks for when they attend conferences or give job talks. Students are required to attend throughout their time in the program and the course is graded. Faculty attendance is expected.

The remaining course requirements are 3 credits of coursework that can be satisfied by courses from an extensive list offered either in our program or by other departments on campus. Approved lists of elective courses are provided on the program website. Faculty in the program provide a number of elective courses. The Division has relative strength in analytical chemistry and natural product chemistry, thus there is a course in mass spectrometry
techniques and applications, as well as an NMR structure and natural product biosynthesis course. The Delivery core provides a number of elective courses that provide content that is unique to campus in the areas of polymeric drug delivery, molecular solids, and noncovalent molecular interactions. Most elective courses are offered in alternate years to bolster enrollment numbers and while understandable, this can complicate student planning when they are expected to complete course requirements in two years. Proposals to make more of these courses required for the PhD have received mixed review, again due to the breadth of the research areas in our Division. Many students are encouraged/required by their PIs to take coursework in other departments due to its direct application to their thesis research. Thus, the addition of more program based coursework is seen as superfluous to those faculty whose research areas are further removed from the core principles of pharmaceutical science. Alternatively, many students and faculty stress the importance of pharmaceutical science coursework to bolster fundamental training in the field for which the degree is based. Employers may expect such training when making hiring decisions. This brief synopsis describes the essence of the parameters of most faculty discussions of the curriculum.

**PhD-Pharmaceutical Sciences**

Minimum credits: 51

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Select at least two of the following core courses:

- PHM SCI 768 Pharmacokinetics
- PHM SCI 786 Natural Product Synthesis, Biosynthesis and Drug Discovery
- BIOCHEM/PHMCOL-M/ZOOLOGY 630 Cellular Signal Transduction Mechanisms

Research ethics/responsible conduct of research course

2

Three additional credits from the Drug Action, Drug Delivery, or Drug Discovery elective lists are required (courses meeting this requirement are listed in the Pharmaceutical Sciences Graduate Handbook)

3

Complete a Research course (PHM SCI 718-PHM SCI 990)

1-12

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(required every fall term)

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(required every spring during enrollment as a graduate student in the program)
Program Learning Goals. The learning goals for the PhD degree are deliberately broad to reflect the inherent breadth of the curriculum and research areas. Our overall goal is produce independent critical thinkers who can communicate the importance of their work and rigorously justify their methodology and results to address knowledge gaps in their field and make significant research contributions. The learning goals stated here are broadly worded but can each be assessed by specific metrics that we already have in place to ensure rigorous training.

- PhD (and MS) Pharmaceutical Sciences Program Learning Goals
  1. Demonstrate critical knowledge and in-depth understanding of principles in Pharmaceutical Sciences as well as the student's specific area of expertise.
  2. Identify important research questions, formulate testable hypotheses, and design experiments to test those hypotheses.
  3. Conduct original research that contributes to the student's field of study.
  4. Communicate scientific knowledge and research results effectively to a range of audiences.
  5. Demonstrates breadth within their learning experiences.
  6. Advances contributions of the field of study to society.
  7. Apply ethical principles in conducting scientific research.

Preliminary Examination. The program expects students to finish coursework and take their preliminary examination by the end of the summer of their second year. There is no qualifying exam; therefore, outside of courses, the preliminary exam is the major hurdle to the student's advancement to dissertator status. The prelim in Pharmaceutical Sciences consists of two parts: (i) a 3-page written synopsis of the student's research progress to date and (ii) an independently prepared research proposal similar to an NIH predoctoral fellowship proposal. These documents serve as content for a presentation to the thesis committee, during which the committee examines the student's ability to answer questions and defend the proposal. The proposal can either be based on the students thesis research or be in an area that is independent of the students thesis research. This decision is at the discretion of the PI and reflects differences in culture between the more physical and biological sciences. The results of the preliminary exam are either a pass, a pass with written revisions required, or a fail. If the student fails, they can be given a chance to retake the prelim at a later date. Alternatively, a fail can result in a student being asked to leave the program, with the option of earning an MS degree by preparing a short thesis and defending that document, given satisfactory course performance and a suitable number of credits earned. Currently, preliminary exam pass rates in the program exceed 90%.
**Annual Review Meetings.** Our students are required to assemble a thesis committee in the spring of their first year and meet with their committees by the end of their first summer. The makeup of the committee includes their advisor, two additional Division or affiliate faculty and one faculty member from a different academic unit. Non graduate faculty are also permitted as stated in Graduate School Thesis committee guidelines. In the student's second year they will take their preliminary exam with this committee, and once they become a dissertator, they will meet annually with their committee until they defend their PhD thesis. These meetings are mandatory and written feedback is required for submission to the GPC. The Program Director reads these reports to obtain documentation that each student is making satisfactory progress toward their degree.

In cases where progress is unsatisfactory, the Program Director will discuss the issues with both the advisor and student to attempt to rectify the situation. For the rare cases which result in the termination of the student-advisor relationship, the Program Director will offer to mediate transition for the student. Outcomes in such a situation are discussed further in section E on student advising.

The program views the role of the thesis committee as providing technical support for the student's research efforts and assessment of the student's ability to successfully complete the program. However, just as important is the committee's role in providing additional mentoring; thus, it can be an additional source of support and ideas for the student's professional development as well as a potential buffer in the student-advisor relationship. The recent development of the use of Individual Development Plans and the broadening of training of PhD students require more active involvement of the thesis committee and annual meetings provide an important forum to discuss the strengths and weaknesses of the student in relation to their career goals. However, it is up to the student to take optimal advantage of the committee as a resource and we encourage students to do so at the first student orientation as well as throughout their time in the program.

**Program Timeline.** The figure below taken from our recruiting presentation shows the overall average program timeline in terms of the sequencing of rotations, coursework, preliminary examination, annual committee meetings and thesis defense. As will be discussed in Section G, the time to degree for the PhD is close to the campus average and reflects the range of student research areas in our program that span the physical and biological sciences.
C. Program Assessment and Evaluation

The Program's Assessment Plan is found in Appendix item C1 and the latest assessment report is found in Appendix item C2. As this was the first year of formal annual program assessment, the program chose to formally assess one learning outcome. Learning outcome #7 - Apply ethical principles in conducting scientific research, was analyzed in terms of discussion of the tools in place and whether they are appropriate to properly assess this learning goal. The most important assessment of this goal is our didactic course in research ethics (726-800), which is taken by most students in the program. The course is extremely popular among the students and taught by a faculty member who has extensive experience in teaching the material. A mixture of students in the PharmSci and Clinical Translational Sciences programs currently take the course and evaluations of the course, instructor and TA are very positive. Most faculty agree that this course is an important part of our graduate program, although course quality will be highly dependent on faculty who are willing to engage with students to stress the importance of the material. For example, we have had issues in the past with academic integrity involving plagiarism, which we dealt with directly and severely. In addition to student orientation, this course is an ideal platform for dealing with such issues through case-based discussion. All of our students met the assessment criteria for this learning outcome when the course was last offered in fall 2016.

An additional assessment tool for this learning goal is the quality of the research done in terms of responsible conduct. This can be partly assessed by looking at the quality of research via the thesis documents produced by our students. Recently, we noticed another instance of academic misconduct in the writing of a PhD thesis, as well as in coursework.
Preventing such instances requires constant vigilance, and we have instituted a policy in which students provide a copy of their thesis to the program director in addition to the thesis committee before the dissertation defense.

The results of these assessments for learning goal #7 were discussed and approved at the first faculty meeting in the fall of 2017. This approach will be taken going forward as applied to all learning goals in future years, in agreement with guidelines provided by the Graduate School and Provost's office.

In general, aspects of the graduate program are discussed throughout the year in regular faculty meetings. Recruiting has been by far the most popular topic of discussion in these meetings, as we constantly strive to improve the quality and diversity of our incoming students. Other topics arise on an as needed basis, and include refreshers on how students are funded, changes in program requirements, and compliance with annual review meetings and other popular policies. In general, faculty are engaged about the program, and the discussion is animated by the fact that the Division is extremely broad, spanning disciplines (and cultures) as disparate as synthetic organic chemistry, physical chemistry, cancer biology, and bioengineering. Consensus building can be blood sport in our Division, and the danger is to end up with a policy that displeases everyone, but the overall trend is to provide both increased feedback to the students and frequent scrutiny and responsiveness of our program to meet the changing needs of the students for successful career outcomes.

**Closing the Assessment Loop - Future Challenges in Training PharmSci PhDs**

We are constantly reflecting on the experience of our students in our program and striving to improve it. Exit surveys by the Graduate School (see Appendix item F2) indicate that 80% of our graduates would recommend our program, while the most cited criticism is the need for more advising on career opportunities. (This is also the most popular critique of graduate students in all programs at UW) The School is fortunate to have a Board of Visitors, (https://pharmacy.wisc.edu/about/office-of-dean/board-of-visitors/) which is an external advisory group made up of alumni/stakeholders who have had successful careers in the pharmaceutical industry or in pharmacy practice. Many members are alumni of our PhD program. The groups convenes at the School every 6 months to receive updates on the 'State of the School' and to provide feedback to faculty and students. Part of that feedback involves discussion of what our graduate programs can do to better equip the students for future success. The topics are wide ranging, but often focus on skills such as project management, risk assessment, leadership and communication skills, etc., that fit into the growing trend of 'broadening' PhD training to provide graduates with skills for increased flexibility in the workforce. As our recent student-run professional development retreat showed, our graduates are involved in a wide variety of occupations after they receive their PhD training, and the Board of Visitors often emphasize the evolution in training that is necessary to keep up with these trends to properly equip our students for future success.

Current discussions in our Division on this movement to broaden PhD training focus on the (in)ability of faculty in our program to provide such content as well as finding the proper balance of a graduate student's time between research, coursework, and professional development activities. It is possible we can tap into our extensive alumni network to
provide extended content in the form of workshops, seminars or short courses, the latter of which is currently provided by our Division of Pharmacy Professional Development (DPPD) in the School. This group has recently agreed to offer their industrial short courses on topics such as ADME training, pharmaceutical analysis, regulatory, early formulation techniques and other topics at a reduced cost to our graduate students. Many of these topics lie outside the range of expertise of our faculty, due to the mismatch between federally funded research priorities and techniques that are seen as fundamental to pharmaceutical scientists. Another possible solution is to incorporate more of this material in our introductory 780 course in order to expose all of our students to more industrial drug development content. The content would likely be provided in part by PhD alumni in industry. Keeping the cost and time required to a reasonable level is likely a key factor to get buy-in from both faculty as well as students.
D. Recruiting, Admissions, and Enrollment

Note: The major source of data for this section can be accessed interactively for all programs as well as Division wide and campus wide student populations. See the Graduate Workbook at:

https://dataviz.wisc.edu/views/GraduateSchoolExplorer/HomePage?%3Aembed=y&%3Adisplay_count=no&%3AshowAppBanner=false&%3AshowShareOptions=true&%3AshowVizHome=no

Enrollment. As shown in the graph below, total current enrollment (58 students) in the Pharmaceutical Sciences PhD program is at an all time high, and approximately 20% above the running average (48) of enrolled students for the past ten years. This number will be 60 in the fall of 2018 because we accepted an entering class of 14 for fall of 2018 while we graduated 12 students.

![Pharmaceutical Sciences Enrollment Trend](image)

The reason for the increase in enrollment is a particularly successful recruiting year for the class that entered in the fall of 2017 as the result of changes in our recruiting approach. We made changes in the way we admitted students which resulted in more overall offers in an effort to increase the number of domestic student acceptances, both from majority and minority groups. This effort resulted in 17 students in the entering class that year, nearly double the average. The School was able to support all students without difficulty this year (largely due to a buildup of donor funds and increased fundraising success). We were also able to place the students into laboratories with only some minor strain. In addition to the size, the demographic mix of this class was close to what we would consider ideal. Of the 17 students, 12 were domestic, 5 international, 9 female, 8 male, and 4 URM students. The answer to the question of whether the program can support class sizes this large on a regular basis is likely no, however, so we tried to moderate our number of offers this spring for the class entering in fall of 2018. That resulted in a somewhat smaller entering class of 14, with demographics that are not as optimal in terms of URM and domestic recruiting. We are always refining the process. There are obviously many variables in recruiting from year to year, so we are not sure exactly what the reasons are for specific successes or failures. The admissions committee and faculty as
a whole are constantly discussing ways to make the process more successful, not just in terms of numbers but in quality and fit of our entering students.

**Recruiting Methods.** Our typical recruiting method has been to bring in a large cohort of about 20-25 domestic students and interview them during a single recruiting weekend in mid-February to show them the range of research in our program and the university as a whole. These students are selected by the admissions committee, made up of about eight faculty, who are a mixture of both junior and senior level from our Division. Letters of invite are sent out to students asking them to interview during the specific weekend in February (for program see Appendix item D1). On the Thursday evening of this itinerary, the visiting students are invited for an informal reception and dinner with current students at the Madison downtown hotel where they are staying. On Friday of the visit, students are treated to an overview of the program from the Program Director, then have a number of (typically) one-on-one faculty visits, lunch, student tours, student panel discussions, an inspiring talk from one of our alumni, an afternoon poster session with awards and refreshments, and finally dinner and informal time with faculty and current students. On Saturday, current students from the student recruiting committee show the visiting recruits the campus and the city of Madison. We survey written input from all of the faculty and students about each visiting student and the admissions committee meets one week after the visit to decide on offers and to rank students for the type of offer. We have limited fellowship dollars, so we currently offer our top recruits full year fellowships, while the rest of the students are offered one semester of fellowships and one semester of TA support. As mentioned, donor-sponsored fellowship dollars are increasing, and we hope these funds will help us better land our top recruits, although it's not clear that there is a strong correlation between the type of offer and matriculation. The Dean has supported two straight years of stipend increases (from $24,000 to $26,000) which also improves our offers (as well as student climate). We also use a combination of both campus and donor funds to provide 'signing bonuses'/transitional funds, to help students with financial issues during their transition to graduate school. Stipend levels for campus and national peer programs can be found in Appendix items J1-J3.

One of the many challenges of recruiting graduate students to our program is that the breadth of research in our Division spans many of the scientific disciplines found at an entire large research university. With this breadth of research comes a similar breadth in the culture of student recruiting. For example, chemistry programs give out offers to students directly without interviews, then invite the students to visit, while biological programs typically interview applicants before extending offers. We are often competing not only with other Pharmaceutical Sciences programs in the U.S., but also the 'pure' science departments, such as Chemistry, Biochemistry, Neuroscience, Chemical and Biomedical Engineering, Microbiology, etc. This puts us at a disadvantage, especially because many students are not familiar with Pharmaceutical Sciences as an advanced degree program and have never taken a course in medicinal chemistry, pharmacology or pharmaceutics. Thus, we tend to attract a certain proportion of students who are adding our program to a basket of these other pure discipline programs.

Because of this competition, and a particularly dismal recruiting year in 2015-16 (7 total students, 2 domestic), we decided in 2016-17 to try giving offers without interviews to our top
15 domestic students based on the usual range of metrics the committee uses to decide on admission. These include GPA, research experience, personal statement, letters of recommendation, and GRE scores. This allowed us to nearly double the number of domestic student offers from 17 in 2016 to 33 in 2017, which resulted in an increase in domestic students enrolling from 3 (18%) to 12 (36%). While we are careful not to overanalyze one good year, this approach certainly allows us to increase offers to domestic students. Additionally, we usually struggle to capture any of our top 10 recruited students in a given year. In 2017, we gave full year fellowship offers to our top 15 students without interviews and 4 of those students accepted our offers which was much better. However, this year (2018) only 1 of 12 such students offered admission, while 50% of the remaining domestic student offers were accepted. We are eager to see how the quality of these two classes compares with previous cohorts in terms of time to degree, productivity and placement. Hopefully we are still identifying students who are a good match to our program. We are constantly assessing our recruiting practices and will make adjustments as best we can. The negatives of this new approach are that we have two recruiting cohorts - those with offers up front and those who are required to interview. Some faculty are uncomfortable with this approach and certainly we cannot have the two groups of students visits at the same time. This requires us to offer different visiting dates for those students with offers. Since they are often most in demand during recruiting season, it has been resource intensive to find dates and set up visits for what becomes multiple smaller groups of students. It’s also not clear if this practice is affecting climate in the program. In the future, we may have to expand to two interview weekends to properly support our increase in domestic offers, something we have been hesitant to do in the past.

Recruiting Data and Trends. The table below provided by the Graduate School shows the recruiting data (admissions, acceptances, enrollment) for our PhD program from 2007-2017.
This data shows that our overall number of applications in recent years are the highest we've seen and are remaining at that level, unlike for grad programs overall which have dipped recently. As mentioned we've recently significantly increased our number of offers. The percentage of students who accept our offers has not changed significantly (about 40% acceptance overall), which is a similar rate to campus programs overall but less than biological programs which average ca. 50%. So the net effect of our giving some offers without interviews appears to mostly be a simple result of allowing us to give out an increased number of offers by not having to schedule interview visits up front for all students before our offer decisions are made.

**International Student Recruiting.** Unlike most programs at UW, we have a high percentage of international students - typically 55-60%, compared to graduate programs on campus overall (~15%). We have a number of faculty who received their undergraduate education in China and who are knowledgeable about the top universities in China. Thus, they are able to accurately analyze applications from Chinese students and identify the top students. They are also familiar with faculty at these institutions who are writing letters for the applicants. Most of the successful Chinese applicants to our program have a first author publication in a Western journal and many have a M.S. degree. India is another source of students for whom we have faculty expertise in recruiting. We cannot afford to invite these students to visit, so for the past 4-5 years we have been Skype-interviewing international students. Typically an admissions subcommittee of 3-4 faculty will interview approximately 20 students and we will make an average of 6-12 offers of which 4-7 will be accepted. Those international students who decline our offers often end up at top universities. Recently, students who declined our offers have are attending Scripps (La Jolla), Northwestern, UPenn, Michigan, and North Carolina. As the graph below illustrates, we typically accept 10% or less of our international applicants and get over 50% of our offers accepted, although this number is not as high as in recent years. Our competition is getting tougher and the students we interview usually have multiple offers from highly regarded graduate programs in the U.S. In terms of performance, our international students are top notch, often finishing their degree in a shorter amount of time than our domestic students with a high number of first author papers and they find excellent jobs either in pharmaceutical industry here in the U.S. or postdoctoral positions, or academic positions in China. The downside of having a large proportion of international students is that they are ineligible for most predoctoral fellowships and thus must be supported by research grants or by TAs. We try to make sure the communication skills of our international TAs are suitable by using the campus SPEAK test mechanism for assessment. We assign students who do not perform satisfactorily to ESL courses on campus.
Admissions and Enrollment Data for International Students in PharmSci PhD Program

**URM Recruiting and Retention.** The Program has made significant progress in the recruiting of students from underrepresented groups. The figure below shows data from the Graduate School for the last ten years. In particular, last year was relatively strong - we had a good number of applicants and also found many of these students to be a good fit for our program. We were fortunately able to attract these students as 4 of the 6 offers were accepted. Three of the four are currently on either fellowship or training grant support. We have benefitted from collaborations with multiple groups on campus, including Dr. Theresa Duello, SciMed GRS leadership, the BOPS collaborative recruiting program, and other graduate programs such as MCP and CMB who are committed to recruiting a diverse student population. The sharing of best practices and student information for those interested in our program has been an invaluable resource for contacting students who already have expressed an interest in us.

Retention efforts need to be in place for all students but particularly for students from minority groups who may feel less comfortable in their work environment. We currently monitor all of our students in terms of progress in coursework and rotations. In addition, the School recently conducted a fairly comprehensive climate survey of all students, in which responses from the School's graduate students has been separately identified and analyzed. Discussion of this data is included in Section F of this self-study. The PhD completion rate for our URM students during 2007-2015 is similar but slightly lower (80% either completed or still enrolled) compared to all students in our program (86%), although the numbers of URM students are small so the comparison can be skewed by one or two outliers. We continue to add content to our orientation and meetings of the Program Director with the students to stress the importance of an inclusive work environment. These efforts are matched by the School overall and are fully supported by the Dean.

E. Advising and Student Support

Advising for Entering Students

When students arrive in the fall of their first year, the program assigns a temporary faculty advisor to guide each student through the program in the first semester or until they choose a thesis advisor. Temporary advisors are chosen based on enthusiasm of faculty members to serve in this role and in some cases specific students are matched if requested by the faculty although we do not attempt to match advisors based on research interests because that is the role of the research rotations. Graduate student peer mentors are also assigned: they can answer questions on housing, transportation, student activities and other topics in which faculty are not as knowledgeable. The GPC and Program Director are additional resources of program information and general advising during this time.

During orientation, the students receive comprehensive information on the appropriate timeline for success in the program, as well as the general skills and habits that make for a successful graduate student. Questions such as work hours, specific breakdown of activities, etc. are obviously varied depending on the culture of each laboratory; however, some general advice common to success in graduate school can be disseminated early and often. These include time management skills, setting goals, taking responsibility for one's progress, seeking advice and additional mentors, attending seminars, reading the literature, and contributing to a positive work environment. Such good habits are initially relayed at orientation and then reinforced in annual meetings of each class with the Program Director. These annual meetings with the Program Director were initiated in the spring of 2017.
Advising Resources for Continuing Students

Once a student has joined a research group, generally by the end of the fall semester in the first year, the thesis advisor should play a major role in advising, in addition to senior graduate students in the research lab. In addition, the program coordinator is always available for consultation. Our GPC, Ken Niemeyer, recently won the 2017-18 staff award for support of international students from the UW ISS; moreover in our most recent PhD student survey, nearly 95% of the students found advising in the program to be ‘good to excellent’ vs 87% of graduate students at UW overall (p. 3 of graduate exit surveys listed in Appendix item F2). Thus, we are fortunate to have such excellent advising support for our students. A great deal of “virtual” career resources are maintained online by the GPC via “BOX” technology and alumni are increasing taking a role in connecting with current students (e.g. LinkedIn). There is a healthy peer-to-peer advising culture in the AAPS organization focused on professional development, socialization, and careers. Further, our student handbook (http://www.pharmacy.wisc.edu/graduate-handbook-pharmaceutical-sciences/) is also a source of information and is a constantly updated ‘living’ document. The handbook includes information on program requirements, deadlines, fillable forms, as well as contact information for who to see in case of disputes or incident reporting.

Monitoring of student progress is also a forum for advising, in this case by the student’s thesis committee. Program leadership has tried to instill a culture of broadening the advisory role of students to include the entire thesis committee instead of having students beholden solely to their thesis advisor. In practice, this is more complicated, but annual review meetings between the students and their thesis committees are mandatory and while compliance took time, it is currently > 95%. These annual reviews include forms that provide written feedback for the student and are reviewed by the Program Director to look for disconnects between student and advisor expectations.

While many students maintain Individual Development Plans, the program does not currently have a mechanism to require these plans, although the students are strongly encouraged to prepare one. They have been added to the Student Handbook and the benefits are discussed in annual meetings of each class with the Program Director. A line item has also been added to the Annual Review form to encourage students not only to prepare a plan but also discuss aspects of their strengths and weaknesses with their committees during their annual meeting.

Student - Advisor Issues

Like most graduate programs, there are instances when students find that their relationship with their thesis advisor is less than optimal for their continued progress toward their PhD. Such breakdowns in the advisor-advisee relationship can occur for multiple reasons. The program tries to educate the students about choosing mentors and research labs in terms of compatibility, and also lists steps to resolve disputes when the relationship breaks down. These steps include approaching the Program Director or GPC, as well as the Division Chair. These resources of course may not be seen as objective by students. Thus, additional resources are listed as preferable options, such as the campus Ombuds office or the Dean of Students office in cases of harassment or bias. The Program Director has been involved in arbitration of disputes between students and advisors with a range in outcomes and thus has experience
advising students on their options per Graduate School policies on the nature of the student advisor relationship.

Because the student advisor relationship can be terminated by either party, a general (unwritten) policy is in place to support students who find themselves without an advisor through no fault of their own, and who wish to continue in the program. The reasons for this situation vary considerably, and on average about one student per class at some point in their career will switch advisors. Most cases involve the moving of faculty to a different institution. Many times students will remain in Madison and wish to work for a different advisor and remain in the program. Our policy is to provide stipend support for the student while the transition takes place. The typical timeframe for such support is one semester and the student is advised to actively seek a new advisor as quickly as reasonably possible. The Program Director assumes the role of temporary advisor during this period. If the student wishes to join a lab within the program there are no stipulations; however, if the student wishes to join a lab outside the Pharmaceutical Sciences Division Faculty (and Affiliate Faculty), then the new advisor must be able to provide stipend support for the duration of the students time in the lab until they obtain their degree. Cases in which the student is leaving a laboratory voluntarily due to issues that are not related to a faculty move are very rare, and the policy of School support in such instances needs to be more closely examined. In such cases, students likely realize this and set up arrangements with another laboratory in advance. Clearly, such arrangements are detrimental to the goals of the program and are discouraged.
F. Program Community and Climate

Efforts to Enhance Climate Among Students and Faculty in Program. The program spends significant resources towards the recruitment of a diverse group of graduate students. The Program Director is currently in his tenth year in the position and has made considerable progress learning about strategies to recruit students from all backgrounds to study at Wisconsin. Much of this learning was through collaboration with campus partners and attending conferences targeted to undergraduates from underrepresented groups. Examples are the national research meetings (e.g., ABRCMS, ChOPS and SACNAS), as well as summer research/recruiting programs initiated at UW (BOPS, SROP). The Program Director has served on the Faculty Advisory Board for the SciMed Graduate Research Scholars community for 8 years. This program provides fellowship and tuition support and professional development activities and community to an ever increasing cohort of underrepresented minority graduate students on campus. In addition, both the Program Director and GPC have attended numerous lectures and workshops concerning best practices in recruiting, retaining and providing a positive climate for a diverse student population.

Success in recruiting a diverse student population must be followed up by significant efforts at student retention by creating and maintaining a positive workplace climate. As shown in the insert below, our recent climate survey results are positive overall (see Appendix item F1 for full survey), in that an overwhelming majority of our students feel that the program treats students with respect and creates a welcoming work environment. However, such data can often obscure unsatisfactory responses from a minority group. Thus, while a majority group will respond that everything is fine and there are no serious issues, members of minority

![Climate Survey Chart](image)

One third of graduate students in the School of Pharmacy have experienced or witnessed discrimination in the School
populations may see things much differently, yet their responses will be minimized in the overall assessment. In our survey, for example, nearly one third of the graduate students responding have personally witnessed discrimination and a similar number feel wary of speaking out about the behavior of students or faculty/staff due to concerns about subsequent treatment. This indicates that more work should be done to create a positive climate and also to instill in all students that they are able to voice concerns without fear of recrimination, and moreover, that we will take their concerns seriously.

We are committed to doing everything we can to foster a positive work environment. This idea of positive climate and acceptance is introduced to the students during orientation and reinforced during annual meetings with the Program Director. (It should be noted that the climate survey was taken in 2016 and the annual class meetings with the Program Director began in 2017). The initial goal of improving climate is raising awareness that most, if not all of us, have unconscious biases that are the result of inexperience interacting with groups or individuals with whom we are unaccustomed to interacting. Acceptance of this simple fact can lead to a greater level of sensitivity when interacting with others and hopefully create a more positive climate, in which differences can be shared without judgement and ignorance can be treated with open discussion and education equally without judgement. It is often difficult to get groups to discuss diversity and bias openly. The Program Director has attempted this in annual meetings with students but frankly with little success. Eyes widen and mouths close. Future efforts will be to leave that to the professionals and employ campus workshops on unconscious bias and effective communication and conflict resolution that are more involved than the 20 minute overview we currently offer during student orientation. It's not clear that these efforts will result in a magically welcoming environment, and it's also not clear we have more issues in this area than the average graduate program but more effort in this area could be helpful.

School Climate. One issue that is not part of the mission of the graduate program per se, is the recruiting of a diverse faculty and staff. In general, this has been a more difficult and underappreciated problem for our School, and has been mentioned by students in past surveys and town hall type meetings. In the PharmSci Division, of the 25 regular faculty and 8 affiliate faculty, none are members of unrepresented groups. Of the approximately 100 members of academic and non-academic staff in the School overall, only three could be identified as such, although gender and international diversity is improving in some areas. The current numbers certainly do not help our domestic targeted student recruiting because a simple scan of the faculty and staff by a visiting perspective student would indicate that diversity is not a priority in our School. There are obvious challenges due to local demographics of the state and pipeline issues in faculty hiring but more effort in diverse hiring practices are likely warranted and could also help in successful recruiting of a more diverse student body.

From an overall School climate perspective, the Dean is committed to both educational efforts to promote a positive work environment as well as supporting more social activities that bring students, faculty and staff together. Graduate students in particular are appreciative of such efforts and most if not all faculty welcome opportunities to interact with students in informal settings. There are a number of such opportunities currently. These include weekly seminars, annual recruiting events, Division and student led research retreats, the annual
student awards ceremony and other events that are purely social. Many of the program faculty are regular attendees at such events and collegiality is a noted reason many students give for why they joined our program. Our task is simply to make sure these events are inclusive and respectful and a positive experience for everyone.

G. Degree Completion and Time to Degree

Degree Completion. The table below tabulates the current data from the Graduate School Data Workbook for degree completion rates for students in our program relative to campus at large (2007-2015 cohorts). In every student category measured, we have significantly better completion rates relative to UW students overall. A significant driver is the strong completion rates for our international student population of over 90%, although every category is over 80%. This data is a strong testament to our student advising as well as the commitment of our faculty as trainers of graduate students. Specific reasons students give who have left our program are nearly always personal, and include illness, relationships, etc. or if a faulty member leaves for another institution. In the latter cases, students usually stay in Madison and find another advisor in our program. Thus, we think the degree completion data reflects that students are pleased with the training and are receiving sufficient mentoring to complete the degree requirements. This is also supported by the PhD exit survey results from the graduate school that over 80% of our students say the program is very good or excellent (98% if you include 'good') and would recommend our program to other students (Appendix item F2)

<table>
<thead>
<tr>
<th>Cohort</th>
<th>%Graduated with PhD/Still Enrolled</th>
<th>%Left program with M.S.</th>
<th>%Left program without degree</th>
</tr>
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<tbody>
<tr>
<td>PharmSci Students All</td>
<td>88.3</td>
<td>7.4</td>
<td>4.3</td>
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<tr>
<td>All UW Students</td>
<td>74</td>
<td>15.2</td>
<td>10.8</td>
</tr>
<tr>
<td>PharmSci URM</td>
<td>80</td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>All UW URM</td>
<td>68.5</td>
<td>15.3</td>
<td>16.2</td>
</tr>
<tr>
<td>PharmSci Internat.</td>
<td>90.9</td>
<td>5.5</td>
<td>3.6</td>
</tr>
<tr>
<td>All UW Internat.</td>
<td>77</td>
<td>14.2</td>
<td>8.8</td>
</tr>
<tr>
<td>PharmSci Domestic Non-URM</td>
<td>85.3</td>
<td>11.8</td>
<td>2.9</td>
</tr>
<tr>
<td>All UW Domestic Non-URM</td>
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<td>15.7</td>
<td>11.1</td>
</tr>
<tr>
<td>PharmSci Female</td>
<td>85</td>
<td>10</td>
<td>5</td>
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Time to Degree. The table and graphs below show time to degree data for our PhD cohorts graduating in the period 2009-2017. We are highly interested in this data and have compiled our own detailed data that includes the graduation time for each of our students (see Appendix item G1 for full data on 67 recent graduates). The mean time to degree in our analysis is 5.16 years for PhD completion. This number is in line with the campus average as well as the AAU national peer average. Since we harbor the full range of disciplines, including physical sciences, where times to degree are typically shorter, to biological sciences where they are longer, we should be comparable to graduate student STEM populations overall. This seems to be the case. Time to degree from one of our recent cohorts shown below (2015-17) shows an increased number of about 5.5 years, but we're not sure that this is cause for concern. Our entering class of five students in 2010 was an outlier and had an average time to degree of 5.9 years. All other classes in the last ten years have finished in an average of 5.2 years or less. Time to degree for targeted domestic (URM) students is omitted for unknown reasons in the Graduate School table below from 2017. We had three URM students graduate with their PhD from 2015-17 with times to degree of 3.75, 4.33 and 5.25 (mean = 4.4). Thus, our recent targeted minority graduates have been stellar in terms of this metric. Certainly, between the low number of required courses in our program, the timing of the prelim requirement, and the increased funding resources, it would be difficult to find additional measures at the program level to further shorten our students' time to degree.

### Median Time to Degree for Degree Recipients + ++

<table>
<thead>
<tr>
<th></th>
<th>2009-11</th>
<th>2012-14</th>
<th>2015-17</th>
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<tbody>
<tr>
<td>Total</td>
<td>5.0</td>
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<td>5.5</td>
</tr>
<tr>
<td>Domestic Non-Targeted</td>
<td>5.0</td>
<td>5.0</td>
<td>6.0</td>
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<tr>
<td>Domestic Targeted Minorities</td>
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<td>N.R.</td>
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<tr>
<td>International</td>
<td>4.3</td>
<td>4.9</td>
<td>5.3</td>
</tr>
<tr>
<td>Female</td>
<td>4.7</td>
<td>5.3</td>
<td>5.5</td>
</tr>
<tr>
<td>Male</td>
<td>5.0</td>
<td>5.0</td>
<td>5.5</td>
</tr>
</tbody>
</table>
Time to Degree Data from GradSchool Workbook for All PharmSci Students 2008-2017

Select Degree Level
- Doctorate
- Master's

Select Student Category
- (All)

Disciplinary Division
- Biological Sciences
- Academic Plan
- Pharmaceutical Sciences PhD

Graduate School Time to Degree: 2008-2017

Select Degree Level
- Doctorate
- Master's

Select Student Category
- Targeted Minority (Domestic)

Disciplinary Division
- Biological Sciences
- Academic Plan
- Pharmaceutical Sciences PhD

Page 26 of 38
Time to Degree Data from GradSchool Workbook for International PharmSci Students 2008-2017

Graduate School Time to Degree: 2008-2017

- 68.4% completed in 5 years or less
- 31.6% took 5+ to 6 years

Select Degree Level:
- Doctorate
- Master's

Select Student Category:
- International

Disciplinary Division:
- Biological Sciences

Academic Plan:
- Pharmaceutical Sciences PhD

H. Career Services and Post-Graduation Outcomes

Placement Data. The program has trained 74 PhD graduates in the last decade (those earning degrees Aug 2009-Aug 2018, inclusive). The program has tracked initial post-PhD positions for these alumni (see Appendix item H2), and various scientist titles in industry are the most common placement, accounting for 34 graduates (~46%). This includes first employers from the pharmaceutical or biotechnology industries (18 graduates; ~24%) such as Abbott, AbbVie, Amgen, Arrowhead Pharmaceuticals, Boehringer Ingelheim, Covidien, Genencor, Genentech, Gilead Sciences, Merck (6 graduates), Mylan, Pfizer, and Upsher-Smith Laboratories. Positions in “other” varied industries (involving mainly scientific titles, as well as toxicity roles, scientific marketing/business and regulatory) capture another 10 graduates (~14%), including biomaterials, chemical, consumer products, cosmetic, and healthcare firms (including 3M, Baxter Healthcare, Dow Chemical, Fontarome Chemical, HEC Group; Kimberly Clark Corporation, L’Oreal, Mendel Biological Solutions, SK Chemical, and ThermoFisher Scientific).

Six (6) graduates (~8%) found first post-PhD employment in contract research/manufacturing companies, including Pharmaceutical Product Development (PPD) (5 graduates) and Patheon.

Postdoctoral positions in academia account for initial post-PhD placement for 30 of the 74 graduates (~41%). Postdoctoral employers include Baylor, Duke, ETH Zurich, Harvard (2), Northeastern, Princeton, Scripps, Stanford, Texas-Austin, UCLA (2), UCSF (2), and the University of Washington. Five alumni have been employed by other departments at UW-
Madison, while four have continued in their Pharmaceutical Sciences advisor’s lab for a time, post-PhD, as a postdoc. Two (~3%) have secured postdoctoral work at academic institutions outside of the United States. Another four graduates (~5%) have secured postdoctoral titles in industry (Bioo Scientific; Invivo Sciences LLC; Merck) or in government (NIH-NINDS).

Three graduates (~4%) have secured faculty positions directly after their PhD experiences, at China Pharmaceutical University (PRC), Dalian University of Technology (PRC), and the St. Louis College of Pharmacy. Among the remaining seven (7) graduates, we can describe diverse first-employers (and titles), including Arbor Scientia (Medical Writer); UW-Madison’s Department of Chemistry (Research Data Scientist), the Wisconsin Alumni Research Foundation (Development Consultant). We have a graduate who gained a clinical chemistry fellowship at the University of Washington. One graduate is currently enrolled in the MD program at the University of Pennsylvania and one earned a law degree at the University of Houston following PhD completion. One May 2018 graduate is currently interviewing, seeking her first post-PhD position.

Reflection of Outcomes on Program Goals. Our mission is to train future scholars scientists and leaders in Pharmaceutical Sciences. Our placement data is supportive of a strong track record training future leaders in industry. This success provides a strong cohort of alumni working in leadership positions who can be advocates for the future success of our program. Current professional titles of Pharmaceutical Sciences PhD alumni, 2000-18, are presented in Appendix item H3. The bulk of alumni hold scientific titles of some type in industry and several have advanced to the “director” level at their employers. There is ample evidence of alumni venturing out of the strict research-and-development stereotype of scientific PhD graduates, though that R&D flavor is strongly represented. Examples include alumni working in corporate strategy, data science, engineering, labeling, quality control, regulatory affairs and writing roles. Not as many of our students end up as faculty in R1 institutions but many have secured teaching roles at universities. We feel the list provides a rich picture of the diversity of the career outcomes of our graduates.

Career services. From looking at campus PhD exit survey data, this is one area that graduate students most find lacking in their programs. In Pharmaceutical Sciences, the emphasis on application of core content to industry occurs early in the required curriculum. The first-semester core course, PharmSci 780, Principles of Pharmaceutical Sciences, introduces students to the language and organizational flow of the drug development process and includes lectures from those working in the field, including the Director of the School’s Zeeh Pharmaceutical Experiment (“Formulations”) Station and visiting scientists from the pharmaceutical industry. While only first-year students are formally enrolled in 780, these guest speakers are publicized and open to the entire graduate student population in the spirit of continually exposing our students to developments in the field. In the fall of 2018, the industrial bent to guest speakers will be complemented by an alumni speaker working as a FDA scientist. The latter speaker has intentionally been invited to bring information to graduate students who are interested in scientific roles in the federal government.

Visiting seminar speakers, which visit weekly during the academic year, consistently meet with students in small settings, such as lunch, where various topics of conversation can be
pursued, including that of the speaker’s career path and career recommendations. These speakers are typically from academia, but occasionally are from industry or other work environments. **Some seminar speaker selections are student-driven:** the student chapter of the American Association of Pharmaceutical Sciences (AAPS) invites an annual seminar speaker (who presents at a division-wide colloquia), and the Drug Action Core encourages graduate students enrolled in its seminar section to select a speaker annually, specific to that core.

**Alumni visiting the university.** PhD alumni on the School’s Board of Visitors or scientists who will be recognized for university honorary citations are often approached to hold “career roundtables” for graduate students coinciding with the days they are in Madison for these meetings/events. We folded distinguished alumni as featured speakers into our two most recent “Research Days” (a.k.a. February Graduate Recruiting weekend). The itinerary on these days have typically allowed the visiting alum/alumna to explore career topics and advice with current graduate students

The UW-Madison Chapter of the American Association of Pharmaceutical Sciences (AAPS) is thriving. Their activities are open to all UW Pharmaceutical Sciences students, though only some students formally join AAPS. The student chapter organizes two professional development “workshops” each academic year, one in the fall and one in the spring semester. These are focused on some aspect of professional development. Separately, AAPS organizes several career “roundtables” each academic year, to provide a Q&A venue for professionals of interest. **The Graduate Studies Office will be working to supplement the AAPS workshop and roundtable schedule in 2018/19,** organizing and funding professional development activities complementary and in addition to the AAPS schedule—we anticipate this mode of operation will be typical moving forward

While the School of Pharmacy does not have a formal Career Services Office, the SoP Graduate Coordinator does host employers for information sessions and interviews on occasion. Recent corporate recruiters connecting with the program in such a way include Pfizer, Celgene, and Merck. The program works with these recruiters to publicize their events and job opportunities to other graduate students on campus that are of interest to the company.

**Career Resources on Campus.** Pharmaceutical Sciences graduate students may utilize the resources of the UW’s College of Engineering Career Services Office (https://ecs.wisc.edu/), including professional staff that will review resumes and cover letters, and discuss job search strategies and topics like negotiation. Similarly, we have a close relationship with the Department of Chemistry’s Career Services Office, which is generously includes our students when it hosts employers or posts job opportunities. The recent change of the entire campus to the “Handshake” software for dealing with prospective student employers, job postings, campus employer-hosted events, etc. should improve this aspect of the student experience campus-wide.

In addition, we diligently direct students to various campus resources in professional development activities for career preparation. These include publicizing offerings from the Graduate School’s Office of Professional Development, the Discover PD tool that includes information of Individual Development Plan preparation and reporting, as well as the Delta Program for Teaching and the 'Future Faculty' series program for students who are interesting in academic careers. Many students in our program have participated in the Morgridge...
Center's Entrepreneurial Bootcamp (https://bus.wisc.edu/degrees-programs/non-business-majors/morgridge-entrepreneurial-bootcamp), which is a one-week technology entrepreneurial workshop for STEM graduate students.

**Overall impression from recent graduates.** A table of survey data from the 2012-2017 graduates below show in addition to a favorable view of advising, our students are more happy with our ability to help them find employment compared to graduate students at UW overall. Nearly 90% of our students report receiving career advice from our program during their time here.

<table>
<thead>
<tr>
<th>Question</th>
<th>Excellent</th>
<th>Very Good</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of academic advising and guidance</td>
<td>50.0%</td>
<td>25.0%</td>
<td>19.4%</td>
<td>5.6%</td>
<td>-</td>
<td>36</td>
</tr>
<tr>
<td>Assistance in finding employment</td>
<td>25.0%</td>
<td>41.7%</td>
<td>16.7%</td>
<td>11.1%</td>
<td>5.6%</td>
<td>36</td>
</tr>
</tbody>
</table>

**Pharmaceutical Sciences:**

**UW Grad Programs Overall:**

<table>
<thead>
<tr>
<th>Question</th>
<th>Excellent</th>
<th>Very Good</th>
<th>Good</th>
<th>Fair</th>
<th>Poor</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Quality of academic advising and guidance</td>
<td>41.5%</td>
<td>27.4%</td>
<td>17.7%</td>
<td>9.1%</td>
<td>4.3%</td>
<td>3950</td>
</tr>
<tr>
<td>Assistance in finding employment</td>
<td>25.0%</td>
<td>24.3%</td>
<td>23.3%</td>
<td>17.0%</td>
<td>10.5%</td>
<td>3931</td>
</tr>
</tbody>
</table>

**I. Overall Analysis of the Self-Study and the State of the Program:**

**Program Strengths**

- The advising resources for the program are outstanding. The experience and capability of the program coordinator (GPC) is an outstanding attribute that enables students to receive timely and thorough information about program expectations as well as facilitate resources required for success in the program and securing employment after graduation.
- The graduation completion rates are excellent for all student subpopulations and time to degree is overall in line with peers (although there may be some recent lengthening that should be monitored)
- There has been a considerable increase in resources invested in recruiting to bring students in as well as professional development resources (travel awards, short courses etc.) to support them while they are here.
- There has been a significant increased commitment and success in recruiting students from underrepresented groups into the program.
- Connections with alumni of the program have been strengthened and are providing needed feedback to program leaders and students with mentoring opportunities and greater awareness of that they are part of extended community
- Strengthening of research cores, particularly the Medicinal Chemistry Center and its affiliation with the Carbone Cancer Center, the Analytical Instrumentation Center and
the Zeeh Pharmaceutical Station provide students with greater access to cutting edge technology to solve research problems at the boundaries of scientific disciplines

Areas for Improvement

- The required courses in the curriculum should be reevaluated to make sure the learning outcome of these courses in aggregate match the skills required of the students for the best career options.
- The identity of the program should be further discussed by faculty in anticipation of increased branding and marketing efforts by the newly hired Assoc. Dean for Marketing and Communications.
- Recent efforts to improve climate among the students, faculty and staff should be increased to promote an environment of mutual respect and freedom of expression. The Program Director should identify and implement trainings/discussion sessions on climate that are to be a required part of progression through the graduate program. A newly constructed Climate Committee will include representatives from the graduate programs and will report to the Assoc. Dean for Faculty Affairs as well as the Dean.
- Professional development opportunities in the program and on campus should be explicitly provided for students.
- Improve resources for supporting the research and professional development of international students in the program.
- Recent changes in recruiting practices will require diligent monitoring for effects on student placement, advising, mentoring as well as program climate.

J. Funding

**Overall Funding Promise to Students.** The program in its offer letters to accepted students commits to funding all students for the entirety of their PhD study, provided they are in good academic standing. The mechanisms for funding during the first academic year include a combination of donor sponsored fellowships and TA support and the amount of each is specifically provided in the letters. The thesis advisors are responsible for student support beginning in the summer of the first year until the student files their PhD thesis and leaves the program. All students are paid the same recommended student stipend, which is currently $26,000 per year. At present, we have full compliance from the faculty on this recommendation. Stipend levels are generally set by the Dean and the Program Director and subsequently communicated to the faculty. Faculty retain the right to call for a discussion on stipend levels if deemed necessary. After a number of years of stagnant stipends, the program has been able to find the resources to raise the stipend during each of the last two years. These increases combined with increased donor funds for fellowships has allowed the program to provide more competitive offers with more fellowships and fewer TAs to our student recruits.

We also actively seek out training grant support from a variety of training grants who are open to our students. Our incoming students have been received awards from both the Biotechnology Training Grant and Chemical-Biology Interface Training Grant in recent years. We also apply annually for fellowships for our minority student recruits from the SciMed
Graduate Research Scholars program on campus and in recent years we've been able to offer 1-3 of these fellowships each year to our accepted URM students. Similar to campus training grants, the SciMed GRS fellowships involve a second calendar year of funding later in one’s graduate training.

**Typical Funding Breakdown and Recent Trends.** Our students are funded by a mixture of RA, TA, and PA appointments as well as external fellowship support. The table and figures below shows data from the Graduate School showing exact numbers and percentages of each funding mechanism from the last ten years. We tabulated the data ourselves for the last two years, but data to Fall 2017 is included in the graphs from the Graduate Workbook Data. The overall percentages of each funding mechanism have been broadly consistent over the last ten years. We currently have approximately 20 TA slots available in the fall and 17 in the spring. The exact numbers vary depending on demand as students from outside our program can be hired during periods of lower demand, or some lecture courses can split a single TA due to low workload. We have two stable project assistant (PA) lines in which students work in either the mass spectrometry or NMR laboratories to assist with running samples and instrument upkeep, as well as a pharmaceutical formulation laboratory (the Zeeh Pharmaceutical Station) that hires students as PAs occasionally. As mentioned, we are fortunate to have a member of our staff whose role in part is to assist students in identifying and preparing predoctoral fellowship applications. This has been instrumental in increasing the quality of our external fellowship support in the period since the last review. For example, we now regularly have multiple NSF predoctoral fellows (three currently), which is the most we've ever had. There are additional smaller fellowships that may not show up in the data, including American Foundation for Pharmaceutical Education (AFPE) that provides partial support for students in a given semester.
Funding Mechanisms for Pharmaceutical Sciences graduate students 2006-2015 (above) and 2016-18 (below).
Trends for the last two years have seen an increase in fellowships due to a very large recruiting class (17 students) in 2017, which was an unexpected but welcome surprise. Fortunately (and surprisingly to the Program Director...), we were able to meet the fiscal...
demand of this large entering class due to the generosity of our alumni donors who have significantly increased their philanthropy in recent years. That combined with two smaller classes in 2015 and 2016 led to a buildup in funds to support the large first year class. Our most recent recruiting class for fall of 2018 is 14 students, which is again larger than the running average of about 11. There is some concern about pressures on TA support going forward but otherwise the demographics of more younger research active faculty in our program has provided ample demand to support the recent increase in student matriculation into our program. As mentioned earlier, the increase in our overall number of students going forward will have to be closely monitored as to funding mechanism as well as our ability to provide the same resources and placement assistance to ensure the same quality outcomes for our students.

**Teaching Assistant Assignment.** TA assignments are handled solely by the Program Director. There is some flexibility with the number of TAs such that in cases of increased demand, small overloads can be accommodated without the need for allotment quotas, algorithmic assignment policies, etc. In extreme cases, TA requests can be denied, at the discretion of the Program Director, usually with input from the Division Chair and Vice Chairs. Priority is given to junior faculty and for emergency bridge funding situations, as well as for faculty who have not requested TA support in the recent past. Typically, the program discourages students being assigned to TA after they are dissertators, although this is necessary in times of funding gaps or to fill TA slots that would otherwise be vacant.

Because the workload is not particularly onerous for some of the courses, TA positions are often the most reasonable recourse to support senior students for whom there are no other funding options. We typically have 2-3 senior students per semester who are assigned TAs for the reasons above. The positive aspect of having senior students TA is that they are often experienced and more helpful to both students and faculty in terms of course support. TA support is based on request and not allotted a priori to faculty. For this reason, the support is not spread equally but tends to aggregate to faculty who train a larger proportion of our students. There is some inequity in the TA allocation that is also due to professional culture, in that faculty in the physical sciences are more accustomed to utilizing TA support than those in biologically oriented laboratories who utilize RA support from research grants and train fewer graduate students. There are many variables, but the intent is to use the TA mechanism strategically to balance course support, support for junior faculty who wish to build a group based primarily on graduate students, and to provide bridge support to faculty in need.

**Funding Summary.** As seen in the graphs, we are fortunate to be able to provide support to all of our students throughout their time in the program. The TA lines of support are critical in allowing faculty to stretch their grant dollars and as bridge funding. With increasing success in development for endowed support funds, we may be able to provide fellowship support to senior students as both merit awards and to alleviate funding gaps.
K. Professional Development and Breadth

Professional Development Culture. As a more applied science program, professional development has always been part of the culture of the Pharmaceutical Sciences Graduate Program. It is present from orientation programming and messages from the Assistant Dean for Graduate Studies and in the culture of the dynamic and broadly represented AAPS student group, which is heavily involved in professional development activities. There are ubiquitous postings and announcements of professional development activities throughout the research tower and the School’s Graduate Program Coordinator has been encouraged in his role to emphasize such opportunities to graduate students. The School’s Events Coordinator complements this with a weekly email of her own targeted to the graduate student population but more school-specific.

The SoP Graduate Studies Office maintains a “virtual career library” for students. For new students just joining the program, resources involving mentoring (https://uwmadison.box.com/s/p4glq5lj8rwzw7t8lk54dmmqtsqdrxh) and professional development (https://uwmadison.box.com/s/3qben39ki5qcytjxb5tmkh2uvtpgg6g) are provided over the summer, as part of the “onboarding” process. Continuing students have consistent access to another BOX folder more focused on assorted career topics—see https://uwmadison.box.com/s/9nq7o4cd7etmmrg7rmvqpy6qq64716f. The SoP Graduate Studies Office maintains a “virtual career library” of sorts for students. For new students just joining the program, resources involving mentoring (https://uwmadison.box.com/s/p4glq5lj8rwzw7t8lk54dmmqtsqdrxh) and professional development (https://uwmadison.box.com/s/3qben39ki5qcytjxb5tmkh2uvtpgg6g) are provided over the summer, as part of the “onboarding” process. Continuing students have consistent access to another BOX folder more focused on assorted career topics—see https://uwmadison.box.com/s/9nq7o4cd7etmmrg7rmvqpy6qq64716f.

Resources and Opportunities. The Program offers an increasing array of Professional Development activities and opportunities to develop their skills. For example, The Dean’s Office sponsored a Pharmaceutical Sciences Graduate Student Retreat (May 2018). It was organized by graduate students for graduate students, and its agenda supported by Midwest-based PharmSci PhD alumni who populated its career panels (focusing on industry, academic, and nontraditional careers). Such large scale, all-day professional development and career exploratory-oriented graduate retreats are planned for the summers of even years (‘20, ‘22, …). The School also supports students to attend the annual Am. Assoc. Pharmaceutical Scientist’s (AAPS) Meeting which allows students to present research and network with other scientists in PharmSci related fields in both industry and academics.

The UW Pharmaceutical Sciences Graduate student body is hosting the 51st Pharmaceutics Graduate Student Research Meeting (PGSRM) in Madison in June 2019; it last hosted this event in 2011. While “Pharmaceutics” in name, this student-organized conference, involving multiple graduate programs from schools and colleges of pharmacy in the Midwest, has grown to include other pharma-disciplines. The multiple day conference provides graduate students a wealth of organizational challenges outside of the laboratory; a true team of graduate students executes the event, while supported by various School offices and employees. This includes opportunities to recruit leaders in industry to participate at the event.
The School’s Division of Pharmacy Professional Development (DPPD) (https://ce.pharmacy.wisc.edu/) regularly offers opportunities for PharmSci graduate students to attend its industry-oriented conferences at reduced prices, or even for free, if contributing via a presentation or poster. The July/August/September 2018 “Land O’Lakes” conferences held at the UW Fluno Center focusing on, respectively, bioanalytical science, pharmaceutical analysis, and drug metabolism/pharmacokinetics are all examples of such. These conferences are mainly attended by scientists from industry, allowing amazing networking opportunities for students interested in engaging in such.

The School has been successful in development work to be able to support six to seven annual graduate student travel awards, which allow students to attend and present at a wide array of national meetings. Such conferences allow for professional networking, a deepening and broadening of one’s research background, and the development of communications skills. According to the program’s PhD exit survey, our students regularly present at meetings away from campus - the mean number of such presentations is around 5-6 and over 40% of our students present greater than ten times on campus. This shows that we prepare our students for future success in giving presentations about their work and developing their communication skills.

Individual Development Plans (IDPs). Currently the program is not requiring students to use IDPs beyond the federal requirement, however, the Program Director talks with the students during orientation and annually after that to recommend their adoption and use during annual review meetings. PharmSci graduate students on NIH grants are using IDPs via the infrastructure that the UW-Madison has created to support such. Over 80% of our 2012-2017 graduating cohort report they received information about using IDPs.

Program Breadth. Our program is inherently broad, requiring the students to be proficient in a number of cores areas that span the entire discipline of pharmaceutical sciences. Just after our last program review, we were one of the first graduate programs on campus to successfully petition the Graduate School to discontinue a minor requirement for our PhD students. Most students at the time were utilizing minor option A to pick a focus area. The result of this decision was to streamline the coursework for the students while retaining its breadth. The focused coursework that was originally part of a minor was then satisfied (although reduced in credits) by individual faculty advising their students to take coursework in areas that supplemented their research. For example, students in the discovery core who are chemistry oriented will often take two graduate courses in the chemistry department. This results in ca. six credits of focus in that area, rather than the previous 9 required for a minor in chemistry. An overview of academic transcripts of our current students indicates that most take at least six credits of coursework that is independent of the minimal requirements for the degree. Historically, before the consolidation in 1996, our PhD programs had extensive course requirements with both breadth and depth. Whether the current array of didactic requirements is a sufficient foundation for a strong career in Pharmaceutical Sciences is open to question and will elicit animated discussion among faculty and other stakeholders. In some ways, we have shifted the responsibility for didactic training in Pharmaceutical Sciences to the individual PIs.
December 17, 2018

To: Steven M. Swanson, PhD
   Dean, School of Pharmacy

From: D.E. Bjorling

Re: Review of the Pharmaceutical Sciences Master’s and PhD Degree Programs

The review committee, comprised of Professors Elaine T. Alarid, James L. Keck, Gail A. Robertson, and myself, have completed the review of the Pharmaceutical Sciences Master’s and PhD Degree Programs as you requested. A copy of this review is attached. Please let me know if you have any questions regarding the review.
2018 Review of Pharmaceutical Sciences Graduate Program

Overall

The Pharmaceutical Sciences PhD program appears to be functioning effectively. Faculty and students expressed satisfaction with the program. Students have been successful in acquiring highly-competitive fellowships (e.g., NSF) to support their training. Faculty and students expressed great confidence in, and satisfaction with, the program administration. Students indicated that the program generally meets their needs but would be strengthened by providing additional career counseling. A challenge for the program is alignment of expectations and activities among the three focus areas of the program. Students indicated that this concern is at least partially addressed by attendance of seminars presented by students mentored by faculty across the program. However, this is an area that requires further discussion by trainers. Additional issues that the review committee identified as priorities included more formal engagement of faculty and students in oversight of the program and development of a succession plan for the current Program Director should he decide at some time in the future to step down. Overall, the program is functioning well and delivering high-quality graduate training that supports the mission of the School of Pharmacy and the University of Wisconsin-Madison. The following materials provide more detail on the committee’s observations regarding areas of strength and areas that should be considered for improvement.

Administration

Strengths

1. Faculty and students consistently praised both the Director (Dr. Lauhon) and the Program Coordinator (Ken Niemeyer) for their efforts on behalf of the program. Dr. Lauhon is viewed as highly consultative with faculty and very dedicated to the success of the program. The work of Mr. Niemeyer in support of the program is very much appreciated, particularly by students.
2. Although not solely the responsibility of program administration, it was noted that changes were made in response to the previous program review that had substantially improved the program and benefited students.
3. Student and alumni tracking appear strong.
4. The Dean of School of Pharmacy supports the graduate program.

Areas for Improvement

1. A succession plan for program leadership needs to be created. This could include identification of an Assistant/Associate Director who could subsequently move into the role of director.
2. Currently, faculty trainers function as a committee of the whole for discussion of program issues and admissions. Establishment of a dedicated advisory or oversight committee for the Pharmaceutical Sciences PhD program would
facilitate identification of future leaders of the program, engagement of student representatives, and more equitably distribute administrative responsibilities. It may be desirable to grant this committee decision making authority. There was the impression that compromises were at times made to accommodate faculty and to reach consensus that were not invariably in the best interests of the program – a committee may reduce such instances in the future.

3. Students do not feel ownership in the program and would like more engagement in decision making. Student participation in program governance would greatly help in this area.

**Recruitment and Students**

**Strengths**

1. Quality of students is in general excellent. This is substantiated, in part, by receipt of outside fellowships to support training.
2. Core curriculum and seminar series help to build cohesion among students.
3. Students are appreciative of activities that provide information on career options, particularly round table discussions with program alumni and individuals from industry.
4. Student activities are particularly focused on, and organized by, the student chapter of the American Association of Pharmaceutical Sciences (AAPS). The AAPS appears central to students in the program.
5. Organized recruitment that includes a research day was well received by faculty, current students and prospective students.

**Areas for Improvement**

1. Recruitment is a challenge. Many potential students are unaware of the existence of the program until they begin searching the Graduate School website. Students also find the program while researching the graduate program in Chemistry.
2. The unique perspective of program and the diversity of available research opportunities are not effectively communicated to prospective students. This is a marketing problem. Website improvements with a responsive IT team could significantly enhance student recruitment.
3. Students accepted into the program are advised to wait until August to select rotations. However, by this time, they find that faculty have already committed to other rotators. The program is strongly encouraged to preclude faculty from accepting rotating students until a common date to allow all students fair and equal access to desired rotations.
4. Although perceived as occurring rarely, students occasionally “fall through the cracks” and fail to receive effective mentoring and guidance.
5. Career counseling is provided, but some students expressed a desire for more activities and direction in this area.
6. Students should be more actively engaged in discussion and operation of the program.

7. Students expressed a desire for more social activities. This may be an issue for the AAPS chapter to take up, but there should be faculty support.

8. Although a high percentage of students participate in AAPS activities, not all are members. If sufficient flexible funds are available, consideration could be given to paying membership dues for all students.

9. Faculty feel student supply falls short of their demands. It is not uncommon for all faculty at UW to serve as trainers in multiple programs. However, faculty indicated a desire for an increase in the number of students available to them through this program.

10. Limited eligibility (i.e., many programs restricted to US citizens) restricts opportunities for international students to distinguish themselves with fellowships, etc. The program has a high percentage of international students, and lack of these opportunities contributes to a class difference and negatively affects climate. Paucity of opportunities for honors for international students could be addressed through school-centered awards (e.g., outstanding thesis, most dedicated outreach volunteer, service award for most involved AAPS chapter leader, etc.).

11. Extend the existing peer mentoring program to include involvement of willing senior students with assigned incoming students. Mentors could drive activities such as getting together outside of campus activities at least twice per semester. Topics for discussion could be broad, including: how to navigate the program; adjusting to graduate school/campus/USA; hobbies; self-care (e.g., exercise, diet, etc.) and the integration of personal with work life.

12. All applications from international students should receive equal review and consideration. It appears that applications from some countries of origin may be prioritized above others.

Program

Strengths

1. The multidisciplinary nature of the program is a significant strength. Three distinct tracks – Drug Action, Drug Discovery and Drug Development – occupy a unique niche in UW-Madison’s graduate training enterprise, and train students for diverse careers in industry and academia.

2. Students appreciate retreats that focus on the program.

Areas for Improvement

1. The website should be revised and updated to provide easier access to information (handbook, mission, timeline, events). Similarly, the student handbook should be more readily accessible on program website.

2. While the multidisciplinary nature of the program is recognized as a strength, it also raises challenges regarding maintaining a cohesive, consistent program.
This may be less an area that requires improvement and more an issue that requires continued attention to ensure that the program remains cohesive and effective for all students and trainers. However, faculty continue to identify with old programmatic designations rather than those developed under a cohesive program.

3. The lack of a common prelim mechanism negatively affects climate due to student perceptions of unfairness. While students appreciate the interdisciplinary nature of the program, current differences in expectations in the formats of preliminary exams creates a culture in which students view different focus groups as more or less rigorous. Establishing a more uniform prelim among the cores that reflects a consensus vision for future training, rather than cultural traditions that differ between cores, could address this.

4. A standardized pathway to degree, including a time-line that describes expectations for each year of graduate school, with set requirements that do not differ between programs should be agreed upon.

5. TAships fail to provide teacher training. This is a missed opportunity.

6. The program handbook should be revised to make expectations for students (prospective and current) more transparent (i.e., example timeline with course curriculum and expectations for each year).

7. IDPs should be required of all students.

8. Related to an item listed under Recruitment and Students above, the students expressed interest in strengthening the mentoring program, particularly more frequent meetings with mentors. The program might want to consider a policy regarding who is responsible for scheduling mentoring meetings (mentor or trainee) and a suggested frequency of meeting. This is not to be confused with meetings of the trainee’s graduate committee.

9. Keeping a single events calendar rather than several different calendars and developing a program newsletter for announcements would improve communication and decrease the number of individual emails to students.

Submitted December 17, 2018

Review Committee:

Elaine T. Alarid, PhD
Professor, Department of Oncology

Dale E. Bjorling, DVM, MS, Committee Chair
Associate Dean for Research and Graduate Training, School of Veterinary Medicine

James L. Keck, PhD
Associate Dean for Basic Sciences, School of Medicine and Public Health

Gail A. Robertson, PhD
Professor, Department of Neurosciences
To: Steven M. Swanson, Dean, School of Pharmacy  
Cc: Melgardt de Villiers, Assoc. Dean for Academic Affairs, School of Pharmacy  
From: Charles T. Lauhon, Asst. Dean for Graduate Education, School of Pharmacy  
Re: Pharmaceutical Sciences Graduate Program Review – Program Response to Review Committee Report  

January 29, 2019

Dear Dean Swanson,

This document serves as the program response to the report by the review committee as a result of our Ten-Year Graduate Program Review. We are pleased that the committee found many aspects of the program to be in line with characteristics of a highly effective graduate program. With any program, there is always room for improvement and the committee has made some excellent observations about areas in which we can do better. Below is a summary of our current thoughts on how we can address their concerns. I want to thank the committee for their service and their thoughtful work in helping us to assess and improve our program.

1) **Administrative concerns:**

We agree with the review committee that the program could benefit from a specific **PharmSci Graduate Committee** that includes faculty who could be part of a succession plan for the program director, as well as students to increase their involvement in governance. Such a group would represent a wider constituency within the program. Items brought to the faculty by such a committee would be more strongly vetted than in the current administrative structure and would lead to greater transparency in the governance process.

2) **Recruitment and Students:**

a) **Recruiting.** The committee has identified the single biggest challenge to a program like ours – branding and marketing. Pharmacy-related graduate programs such as ours have a difficult time communicating the unique value that we bring to graduate education relative to a ‘pure’ discipline. This value includes highly interdisciplinary training, as well as an increased exposure to translational and industry related research. Fortunately, the School of Pharmacy has recently reinvigorated its communications and marketing efforts with the appointment of a new Associate Dean and staff. Thus, we will initiate a **new marketing strategy** for identifying and increasing the number of qualified PhD applicants who would be a stronger fit for our program. This will hopefully make our recruiting more efficient and increase the number of potentially interested students we can reach. Success in this area will be measured by increases in matriculation of our top ranked students as well as our ability to satisfy faculty demand for students, as mentioned in the committee report.
b) Student Experience.

- **Climate**: Many of the social and governance issues that are lacking for students may be addressed by the new Graduate Committee. The Dean has been a leader in the area of building of community within the School with increased social activities involving faculty, students and staff. We have increased our PhD alumni involvement in the School in recent years in the form of research retreats and professional development activities which we will continue going forward.

- **International Students.** Although our international students compete very well for travel, teaching and service awards within the School, we will consider increases in the number of student awards using new funding ideas from the Dean. This may compensate for the intrinsically low number of national awards available for international students studying in the U.S.

- **Retention.** In terms of mentoring, we have increased our efforts at having more frequent ‘check-ins’ with each class of students, and introduced peer student mentors, but we can think about more effective methods to prevent students who struggle from getting discouraged. Senior student mentoring may indeed help in this regard as well as more explicit expectations in our handbook and courses.

3) Program. Much of the concern from the committee is a result of the extreme scientific and cultural breadth of our program. Since we are a single Division and not separate departments, this is both an attribute and an ongoing challenge. While we believe we have made progress in this area (especially in recruiting), there remain evolutionary remnants (such as the prelim format) that reflect the cultural differences. In response to the current concerns, we will consider the following:

- **Handbook.** We will reevaluate the student handbook for increased clarity on expectations, especially in the area of rotations, mentoring, guidelines for success, preliminary exam format, teaching workshops, and examples of successful graduate program timelines. Such issues will be discussed in the new graduate committee before changes are brought to the Division if required.

- **IDPs.** We will consider making student Individual Development Programs (IDPs) a requirement in the program (currently they are only encouraged).

- **Mentor Training.** We plan to implement mentor training for our faculty – such training is now more accessible on campus and will give faculty examples of best practices that can improve communication between mentors and students

- **Communication.** We will consolidate information sources (e.g. events calendar career services) for our students wherever possible.

Once again, we thank the committee for their thoughtful input and hope these initiatives will both address their concerns and improve what we believe is a strong program.

Respectfully Submitted,

Charles T. Lauhon, PhD
Director of Pharmaceutical Sciences Graduate Program